

July 2007

FREC RR07-02

Preserving Farms and Forests in Sussex County, Delaware: Public Value

Joshua M. Duke, Robert J. Johnston,
Tammy Warner Campson

**FOOD
& RESOURCE
ECONOMICS**

FREC Research Reports

Department of Food and Resource Economics • College of Agriculture and Natural Resources • University of Delaware

Preserving Farms and Forests in Sussex County, Delaware: Public Value

Joshua M. Duke, Ph.D.

University of Delaware

Robert J. Johnston, Ph.D.

Tammy Warner Campson

University of Connecticut

July 2007

This research was funded by the National Research Initiative of the Cooperative State Research, Education, and Extension Service, USDA, Grant 2003-35400-13875, and by the Coastal Community Enhancement Initiative. Opinions belong solely to the authors and do not imply endorsement by the funding agencies. Any remaining errors are those of the authors.



Executive Summary

This report describes results of the **2005 Delaware Community Land Preservation Survey**. This survey was a carefully designed choice experiment, which assessed the amount that Delaware residents would be willing to pay in increased taxes and associated fees to preserve farm or forest land in their local communities. Survey results quantify the value that Delaware residents have for different types of farm and forest preservation. Results indicate that the value of farm and forest preservation can be substantial, and can vary widely depending on the kind of land under consideration, the method used to prevent development, and the risk of future development on unpreserved parcels.

This study considers preservation of various farm types in six Sussex County communities. When considering additional preservation in the range of 20 to 200 acres, the average community value per acre of preserving, for example, a poultry farm with the purchase of development rights is \$27,707 in total capitalized value.¹ This value reflects the benefits that residents derive from the preservation of undeveloped land in their communities. Although these non-market public values are substantial, they represent an underestimate of total public value because they do not account for benefits accruing to residents in other communities, nor do they include the (otherwise easily measured) value of farm products. Non-market benefits of farmland preservation are composed mainly of residents' non-market values for amenities such as recreational access, scenic vistas, and community character. These values are **not** captured in prices paid for farm and forest land in market transactions. As a result, market prices underestimate the true value of farm and forest to Delaware residents.

Sussex County Character

Sussex County, Delaware, displays a rich diversity in its geography, land uses, and agricultural production. Residents and visitors value the scenic beauty and recreational opportunities afforded by the County's beach communities, inland communities, working farms of various types, and forests. The public expresses these values in numerous ways, including support for County land preservation initiatives and for the State's commitment to preserving farms, forests, and open space.

The public's willingness to pay for land preservation derives from the non-market *amenity benefits* provided by rural lands—the “**public value**.” These benefits are direct, positive influences on people's quality of life, and are not often reflected in market values of land. Over time, market forces—which reflect market values only—often lead to too much development and too little preservation of farm, forest, and open space. Between 1997 and 2002, Sussex County lost 10 percent of its land in farms.² The challenge for policy makers is to find a way to quantify the true value of farm, forest, and open space preservation to Delaware residents, and to incorporate these values into land use and preservation decisions. This report presents results from a study that uses economic valuation techniques to estimate these public values.

Preservation in Sussex County

By May 2007, Delaware had spent over \$45 million on conservation easements to preserve 26,723 acres in Sussex County. These expenditures reflect the public's willingness to accept tax increases in return for land preservation, or *willingness to pay*. However, these public expenditures do not necessarily reveal exactly what types of preservation people value, or the magnitude of associated values. Building on the voting model, however, economists have developed methods for measuring willingness to pay for environmental amenities (such as those provided by farm and forest land) by replicating a voting situation in carefully designed surveys. This method is

called the *choice experiment*. Choice experiments let researchers quantify the benefits that people receive from preservation of particular types of farm, forest and open space. The results of these studies reveal the public value of land preservation to Delaware residents.

In 2005, researchers from the University of Delaware and the University of Connecticut mailed a self-administered choice experiment survey to 750 randomly selected households in Georgetown and to another 750 in the Smyrna area. Of the 1,388 surveys that were deliverable, 35 percent were completed, generating a sample of 491 responses representing a broad cross-section of area residents. The survey presented respondents with a chance to vote yes or no over many different land preservation options with varying tax costs to their households. Statistical analysis of thousands of votes over hundreds of different preservation choices enabled researchers to derive estimates of the average willingness to pay to preserve different types of farm and forest land. These estimates allow researchers to predict the additional taxes and fees that residents in various Sussex County communities would be willing to pay in order to obtain specific types of farm and forest preservation in the County.

What is the Public Value of Preservation?

Survey responses reveal willingness to pay per household, per acre, per year, for the type of open space specified in the survey questions. Aggregating (or adding up) responses over households in a given community provides an estimate of the total annual value per acre. Communities were defined as all the households in the zip code of a given town: Dagsboro, Georgetown, Laurel, Millsboro, Milton, and Seaford. Annual values can be capitalized over time by discounting the future cash flows at an appropriate rate (in this case, 6 percent).³

Based on these methods, for example, **the average value that residents place on preserving each additional acre of a poultry farm in their community is \$27,707 in total capitalized value.** The public values differ

depending on the type of agricultural production, the technique used for preservation, and the risk of development. The highest preservation values obtained in this survey were in excess of \$121,373 per acre in capitalized value. Although much higher values were calculated for lands that offer public access for walking or hunting, these results are not reported here because public access to preserved land is not common in Sussex County.

The figures⁴ at the end of this report show matrices of different preservation options and their associated values for six communities in Sussex County.⁵ Definitions used in each matrix include the following:

- **Outright purchase** means purchase and preservation of farm and forest by government or nonprofit groups (land trusts).
- **Preservation contract** (also called *conservation easements* or *purchase of development rights*) means that interested landowners are paid a fee in return for placing a legal contract on their land that prevents all future development.
- **High risk** means land that is likely to be developed within the next 10 years if it is not preserved.
- **Moderate risk** means land that is likely to be developed between 10 and 30 years if it is not preserved. Values for farms at low risk of development are not reported because most farms in these communities are exposed to moderate development pressure.

By cross-referencing preservation methods and types of land in the figures, one can locate specific preservation values. For example, a 50-acre forest parcel in Dagsboro, preserved via a *conservation easement administered by a land trust*, providing *no access*, and at a *high risk of development*, has a capitalized value of \$6,185 per acre. A 150-acre grain farm, preserved via a *conservation easement administered by the state*, providing *no access*, and at a *moderate risk of*

development, has a capitalized value of \$61,978 per acre.

The numbers in this report are for *community preservation initiatives* where the specific location of preservation is known to be in a given community. As a result, small annual per household values are multiplied by the larger number of households in each community, generating larger aggregate values for the entire community. The yearly willingness to pay per household is reasonable (often only a few cents per acre preserved).

It should be emphasized that preservation can also benefit households that are outside the zip code of the given community. These additional values are not shown in the matrix. In most cases the higher relative local values shown here can (with a few adjustments) be added to values throughout the state to obtain even larger total preservation values. These statewide values have been calculated by the authors of this report, but are not included in the matrix.

The Benefits and Costs of Preservation: An Illustration

How can the dollar amounts in the figures be used to assess the benefits and costs of open space preservation in Sussex County communities?

Consider an illustration of preservation in Sussex County. Recently, a farm of 52 acres was preserved by the State of Delaware using conservation easements. The State paid \$375,147, or \$7,214 per acre.⁶ This farm was relatively expensive when compared to an historical average per acre cost of \$1,452. Although State records do not allow identification of the particular farm, the results from the matrix suggest that it likely passed a “benefit-cost” test. That is, the benefits of preservation almost certainly exceeded the costs. For example, if the farm was a high-development-risk forested parcel in Seaford, then the benefits to the community would be \$1,492,296. Hence, preservation would have net benefits exceeding \$1 million. These net benefits (benefits minus costs) would be even larger if

one were to add in the benefits accruing outside Seaford.

These results also point to the difference between the **market prices** negotiated in these types of land transactions and the **willingness to pay values** reported here. It is important to keep in mind that willingness to pay reflects the public's values for the benefits that they receive from open space. Benefits from open space derive from such things as recreational uses, scenic vistas, community character, or appreciation of the fact that farm and forest can be passed on to future generations. **These benefits are not generally reflected in real estate prices.**⁷ In contrast, this study shows that the public benefit from open space preservation can be far in excess of the market prices paid for particular parcels of land. In other words, open space preservation is often a good value for the residents of Sussex County—the benefits far exceed the costs.

Do these Results Make Sense?

Yes, these results make sense, and they are consistent with values found repeatedly in other areas of the country. Although these values—willingness to pay frequently in excess of \$10,000 per acre—are quite large in aggregate, they are based on reasonable and modest yearly payments per household. For example, if the 5,278 households in Georgetown were willing to pay merely 10 cents per acre, per year, that would add up to a total capitalized value of \$8,797 per acre.

These numbers are, however, based on survey responses, not actual binding votes. Do people answer the surveys the same way they would actually vote? Research shows that surveys such as this one can predict actual votes and willingness to pay very closely if the survey is properly designed.⁸ Moreover, results such as this are common nationwide, and particularly in the Eastern United States. Many other East Coast open space preservation analyses have shown large public values for the preservation of rural lands.

What Does this Mean “On the Ground”?

As an example, consider a 200-acre grain farm near Laurel and assume it is at high risk of development. The econometric results suggest that the public value per acre is \$34,299, or \$6,859,800 for the entire farm. In other words, this farm is important to the people living in Laurel and they would receive a large benefit if it were preserved through the state easement program.

The numbers can be further broken down. First, consider the cost side. If the state easement program preserved the parcel, then the costs of preservation would be borne by all state residents—funding for this program mainly comes from general revenue. Since the population in Laurel's zip code is small (5,543 households) relative to the state's population, Laurel residents would only bear a small percentage of the costs of preservation. For comparison, at the 2007 historical average cost of preservation, it would cost only \$290,400 to preserve this parcel. A typical Laurel household would only bear approximately \$1 more in taxes in their lifetime, or **\$0.06 per year in increased taxes**.

Now, consider the benefits side. The Laurel households would receive average **benefits of \$74.25 per year**.

For Laurel residents, this is a great bargain: **Yearly benefits of \$74.25 for a cost of \$0.06.**

Furthermore, this does not imply that the other residents of the state are getting “stuck” with the tax bill, while Laurel residents enjoy the benefits. The costs to preserve this farm for all Delaware households would be approximately \$0.06 per year. Research shows that even outside of a community, residents receive benefits from preservation.

Implications for Sussex County

Willingness to pay for land preservation in Sussex County can be substantial. Real economic value derived from open space

preservation frequently exceeds \$10,000 per acre—just for the community. This public value often far exceeds the market cost of preserving this land. As a result, Sussex County as a whole tends to be better off when farm and forest land is preserved and worse off when it is left unpreserved and open to development—at least for the next set of parcels preserved. The benefits associated with farm and forest preservation can differ markedly, however, depending on the type of land preserved. Nonetheless, most land-use types are associated with substantial preservation values.

What Does this Mean to You?

The report has focused on the benefits to residential households. But the results have implications for other groups.

All types of stakeholders should take one message away: agricultural land preservation can enhance social welfare dramatically, but that does not mean that every parcel should be preserved. Some parcels are high priorities—provide high public value benefits relative to the costs of preservation. Other parcels have public value benefits below the costs of preservation and probably should not be preserved. Further implications may apply *if you are a*:

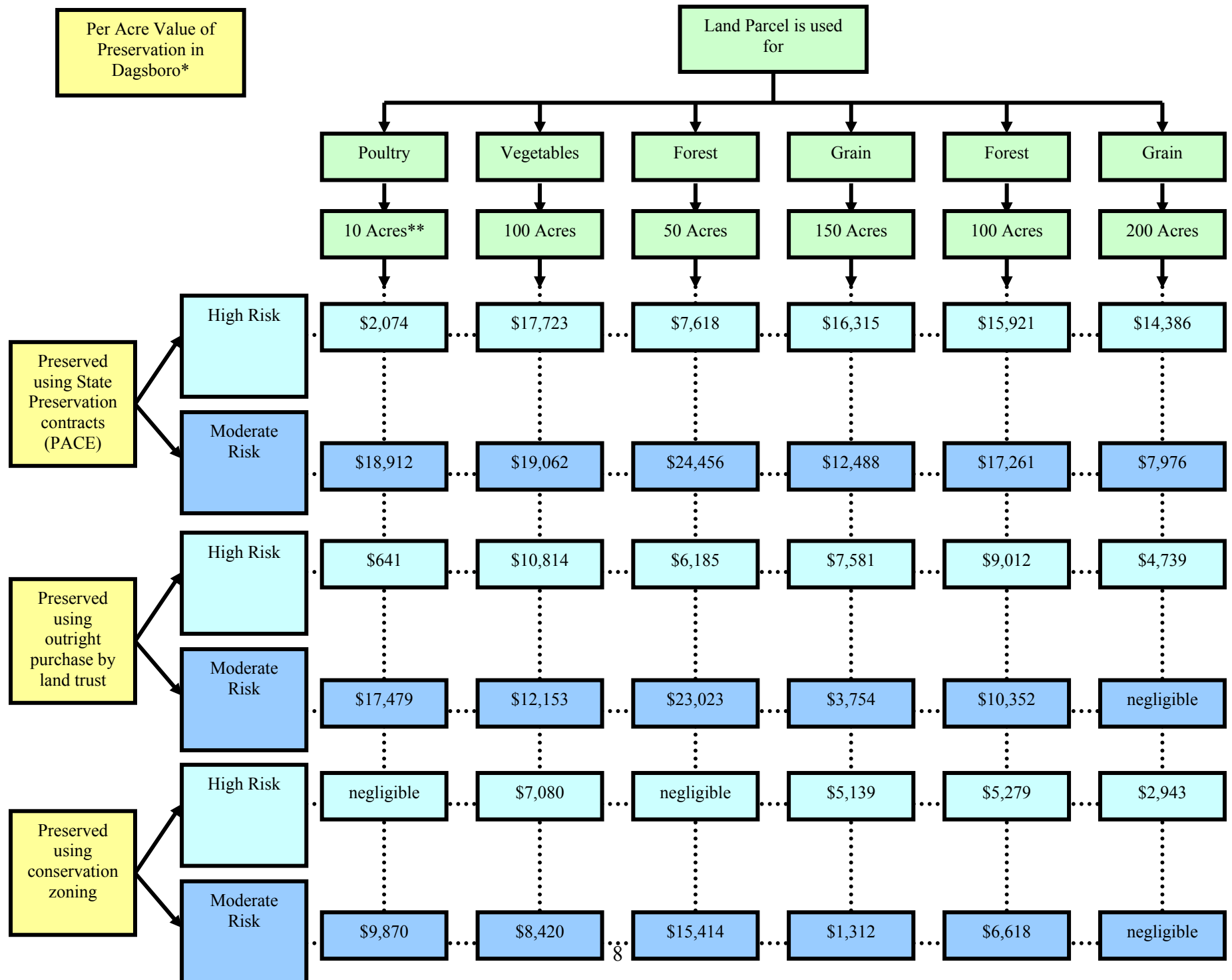
Farmer: The public passively enjoys the use of your land. Preservation of your land would provide large, permanent benefits to the public. Some preservation programs compensate you for these services. You may want to take advantage of these programs. You also may want to participate in the political process, encouraging decision makers to increase the funding for preservation—especially since current payments tend to be far below the benefits provided. This is especially true if you “discount” your development rights when participating in the state easement program. However, you should recognize that not all farms are valued highly by the public and that public values are not necessarily tied to the attributes of farms that make them profitable in production (like soil quality). Preservation program decision makers will select some farms and not others.

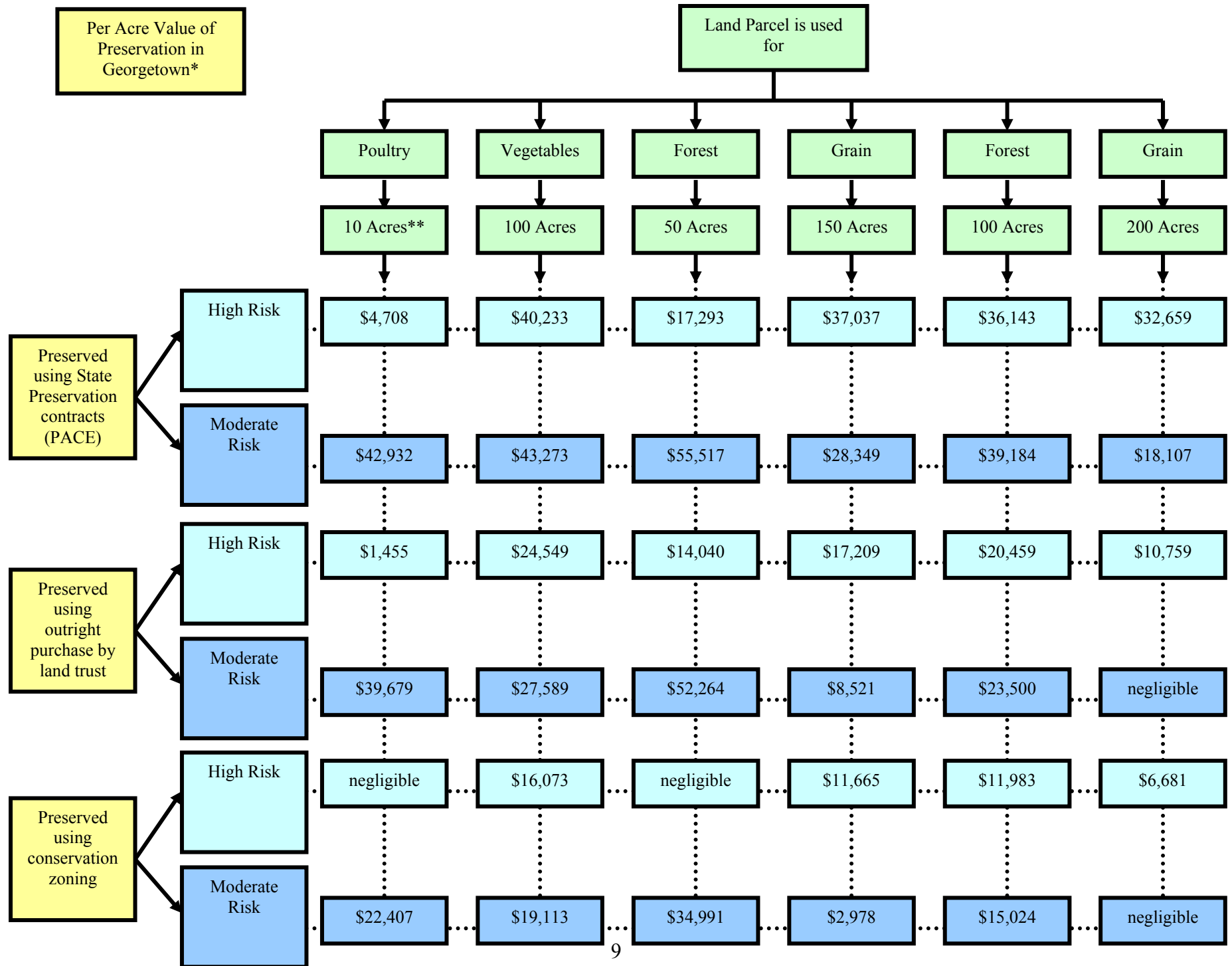
Taxpayer: Delaware funds most of its preservation through general tax revenue. Personal income tax is one part of Delaware’s general tax revenue. This means that most costs of preservation are distributed among all households, but will tend to fall more heavily on those households with higher incomes. Is the tax burden large? Delaware’s preservation easement program has spent about \$10,000,000 per year since its inception. On average and assuming all revenue comes from personal income taxes, this amounts to about \$33 per household per year. Research shows that the public value benefits of preservation, on average, will exceed these costs.

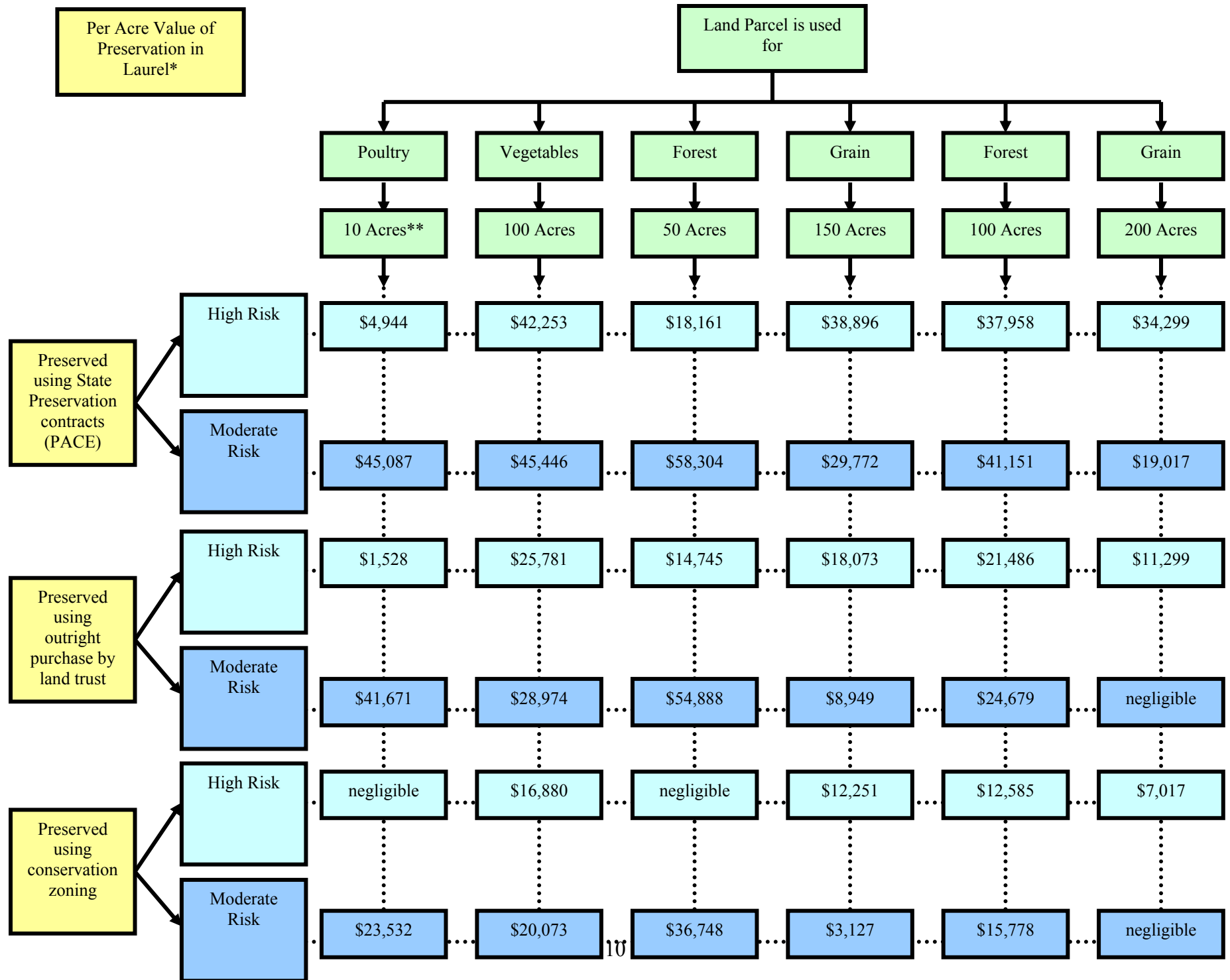
Environmentalist or Conservationist: Agricultural land preservation tends to make economic sense. Preserving other types of land also may make economic sense. This report does not value lands that are entirely in a natural state; such public values may also be quite high. This and other research, however, shows that the public gains benefits from preserving **working** farmlands. That said, preserved and working farmlands can maintain a host of land types (cropland, forest, wetlands, meadows, etc.) and support many activities (agrotourism, hunting rights, walking, etc.). Farmers may use private markets to supply these activities because they are not required by preservation programs.

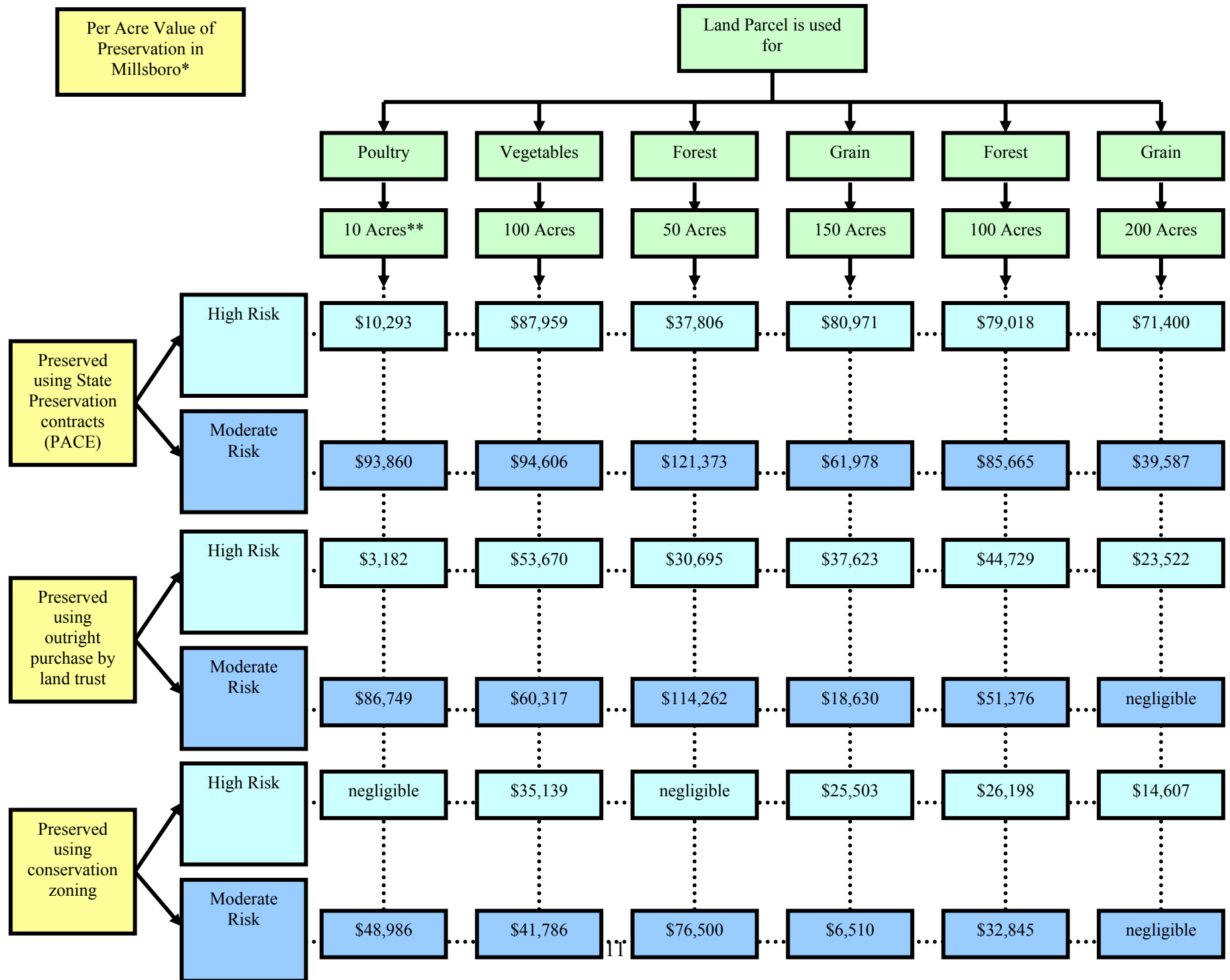
Lawmaker or Planner: Preservation tends to make economic sense. It tends to increase social welfare, i.e., it makes Delaware wealthier. In the near term, at least, preservation will likely continue to enhance welfare. Continued and increased funding may be warranted. However, the results also show that all parcels do not have equal public values. A targeting plan is warranted, and such a plan should use public values to rank parcels more than the current practice, which relies most heavily on land-use characteristics that affect farm profitability. Next, easements are bought at costs that tend to be much lower than the public value. Higher easement payments would still tend to generate welfare enhancing outcomes. Also, although preservation will tend to enhance welfare on average, some residents will benefit and some may not benefit. Decision makers should carefully monitor the expected distribution of

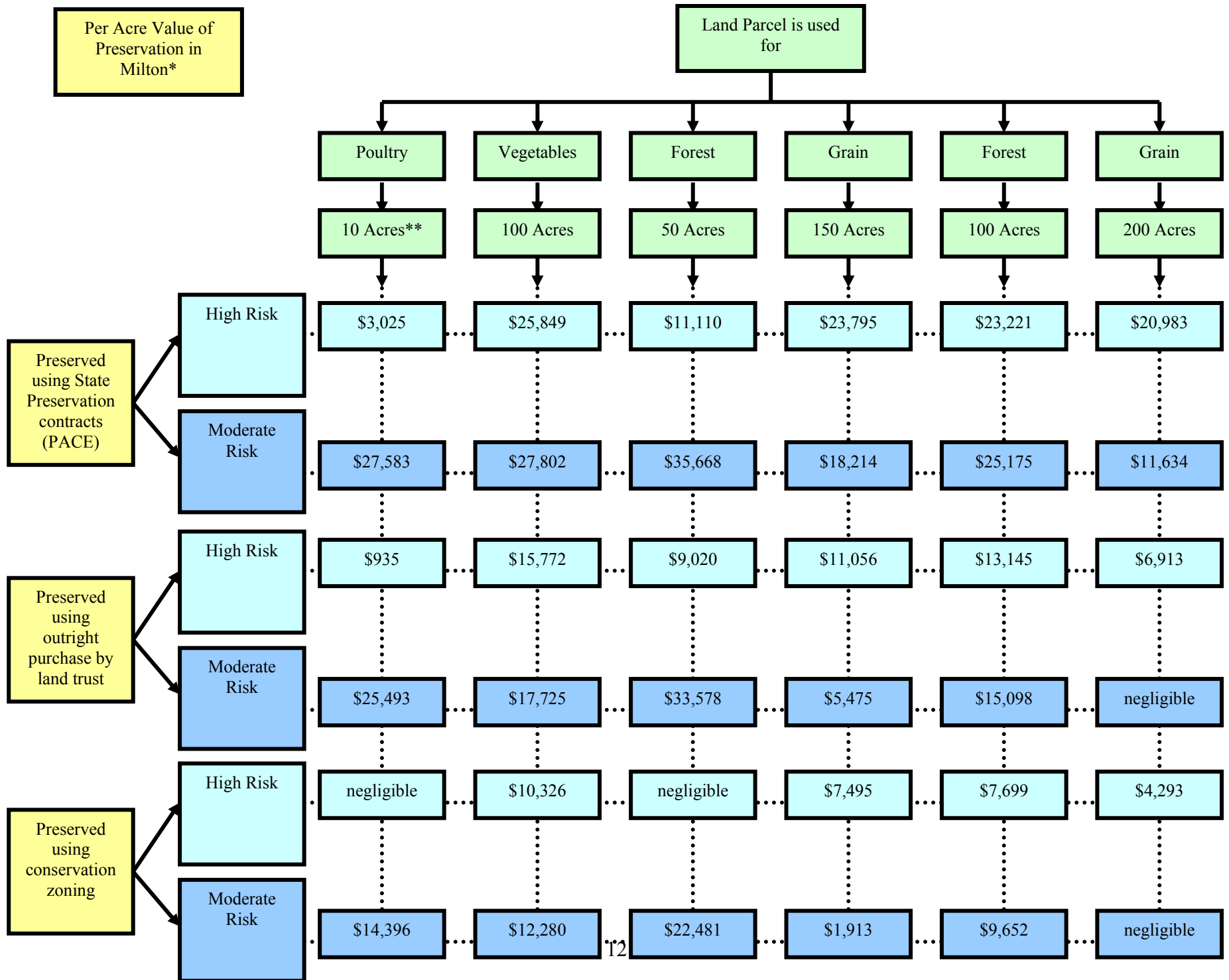
costs and benefits. Nevertheless, given the way Delaware funds preservation and in light of results from academic research, the costs and the benefits of preservation tend to be widely dispersed.

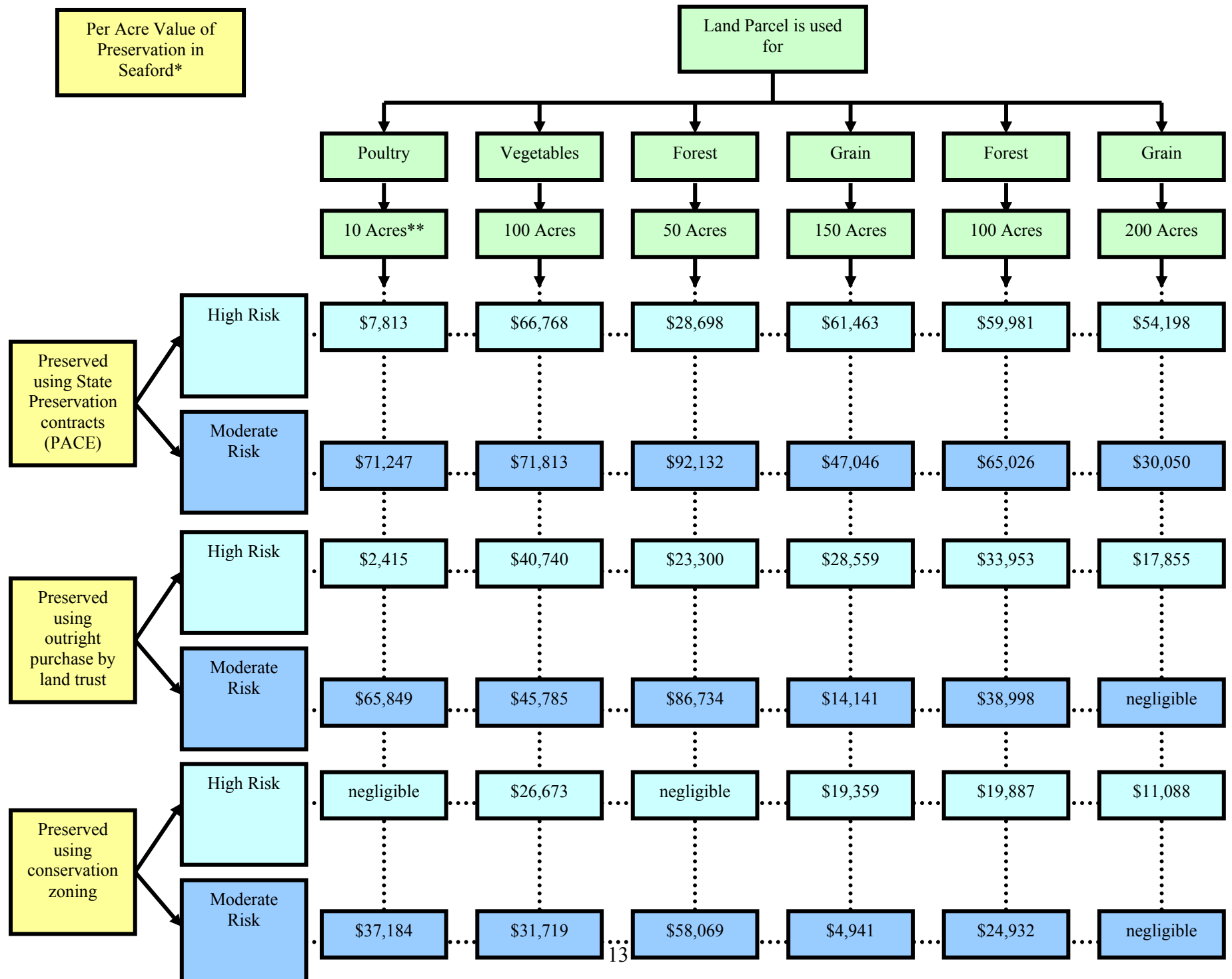












About the 2005 Delaware Community Land Preservation Survey

This research was funded by the National Research Initiative of the Cooperative State Research, Education, and Extension Service, USDA, Grant 2003-35400-13875. The study was designed to help policymakers better understand the values that the public holds for the preservation of farm, forest, and open space. The principal investigators on this study were Joshua M. Duke, associate professor, Departments of Food and Resource Economics and Economics, and the Legal Studies Program, University of Delaware, and Robert J. Johnston, associate professor, Department of Agricultural and Resource Economics and associate director, Connecticut Sea Grant college program, at the University of Connecticut.

The experimental design was completed by Lidia Rejto and Diccon Bancroft at the University of Delaware STATLAB. Tammy Warner Campson is a graduate research assistant in the Department of Agricultural and Resource Economics at the University of Connecticut, and assisted in analyzing study results and writing this report. Steve Ernst and Allison Borchers are graduate research assistants in the Department of Food and Resource Economics at the University of Delaware, and assisted in the survey preparation and matrix analysis. Further information on the study, data, and methods is available from Dr. Joshua M. Duke, Food and Resource Economics, University of Delaware, Newark, DE 19716; 302-831-2512; duke@udel.edu.

Publication of this report was made possible through a 2007 grant from the Coastal Community Enhancement Initiative. We are indebted for guidance and support to the leadership team for this initiative: James M. Falk, Bernard L. Dworsky, and William McGowen.

Endnotes

¹ Total present value over all future time periods.

² National Agricultural Statistics Service, *2002 Census of Agriculture*, 2002, Washington DC.

³ This is the same method that would be used to assess the market value of a business or a working farm the provided a flow of revenues every year. The (present) value of a business is the sum of all the expected cash flows generated by that business – in essence, a purchaser is paying now for the opportunity to obtain income in the future. But people will not pay a whole dollar today for the opportunity to obtain a dollar in the future. Future cash flows are worth less than present cash flows, reflecting the time value of money. As a result, future cash flows must be *discounted* in order to make them comparable to cash flows today. A discount rate of 6 percent means that a dollar to be received next year is worth 94.3 cents today, a dollar to be received two years from now is worth 88.9 cents, and a dollar to be received 20 years in the future is worth only 31 cents today. Adding up all the (discounted) future cash flows over time is called *capitalizing* an investment.

⁴ The poultry farm calculations assume simultaneous preservation of fifty total acres (four additional farms), but present the average value for one ten-acre farm. This is indicated in the matrices with the symbol, “***”.

⁵ It is important to note that these values are applicable only to the next parcel being preserved and should not be used to evaluate all of the remaining open space in any community. This is because of diminishing marginal utility – as additional farm land is preserved, people’s willingness to pay will diminish.

⁶ Delaware Department of Agriculture, http://dda.delaware.gov/aglands/forms/2007/050107_CurSitRpt.pdf, accessed May 9, 2007.

⁷ For example, this study should not be interpreted as suggesting that land trusts should offer \$100,000 per acre for open space throughout the state, when the local real estate markets value the land at a quarter of that price.

⁸ See Johnston, R.J. 2006. Is Hypothetical Bias Universal? Validating Contingent Valuation Responses Using a Binding Public Referendum. *Journal of Environmental Economics and Management* 52(1): 469-481.